

# CHECKLIST AND ACCOUNT OF THE LOPHOGASTRIDA (CRUSTACEA, PERACARIDA) OF THE CANARY ISLANDS, WITH NOTES ON TAXONOMY AND BIOGEOGRAPHY OF THE SPECIES

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## RESUMEN

Las aguas que rodean el archipiélago canario constituyen las de mayor riqueza de especies de lofogástridos en el Océano Atlántico, con doce especies meso y batipelágicas de este grupo. Esta diversidad es debida a la elevada intensidad de nuestros conjuntamente con las favorables condiciones marinas. Todas las especies citadas son propias de esta zona, aunque el grado de endemismo es muy bajo. Diez especies son consideradas cosmopolitas y dos presentan una distribución restringida al área Atlántica, encontrándose limitada una de ellas al Atlántico Este. Además, se analizan a nivel biogeográfico las áreas de distribución de las especies canarias de lofogástridos con zonas adyacentes (Macaronesia, Mediterráneo y Costa Atlántica Africana).

**Palabras clave:** Crustacea, Lophogastrida, plancton, mesopelágico, batipelágico, Islas Canarias, Océano Atlántico

## ABSTRACT

The species numbers of lophogastrids in open waters off E. Atlantic islands (Azores, Madeira, Canaries, and Cape Verdes) exceed those in waters off N.W. African continental coasts and in the Mediterranean Sea. With twelve currently known, mainly meso- to bathypelagic species, the waters off the Canary Islands appear to be the most species-rich in the Atlantic Ocean. This comparatively large number may reflect high sampling intensity in combination with favourable environmental conditions. All the here documented species appear to be indigenous, but the degree of endemism is very low: ten Canarian species are cosmopolitans, two are endemic to the Atlantic, only one of the latter two is restricted to the E. Atlantic. Biogeographical data are provided for the lophogastrids from the Canary Islands and surrounding areas (Macaronesian region, Mediterranean and Atlantic African coasts).

**Key words:** Crustacea, Lophogastrida, plankton, mesopelagic, bathypelagic, Canary Islands, Atlantic Ocean

## INTRODUCTION

The present contribution critically evaluates the literature data along with original records of lophogastrid species in the framework of large-scale surveys on the marine biodiversity of the Canary archipelago. Consideration is also given to the species diversity in open waters off the Canaries versus that off other E. Atlantic archipelagos, off W. African coasts, and in the Mediterranean Sea. The literature data for the Gulf of Mexico is provided for comparison. Finally, the importance of potential endemics as opposed to pan-thalassic cosmopolitans for local faunas is evaluated.

The lophogastrids are shrimp-like marine crustaceans with stalked eyes. They are characterized by an elongate carapace fused with anterior thoracic segments but not with some of the terminal ones. Eight pairs of biramous thoracic legs are present, all or only some equipped with gills. Thoracic exopods are feebly to moderately developed, supporting the respiratory current and swimming; the endopods are variously specialized, such as for filter feeding and grasping prey. Females carry eggs and larvae in a brood pouch below the thorax. A marsupium is formed by seven pairs of oostegites. The five pairs of pleopods act as strong swimming legs; all are biramous and well developed in both sexes, without sexual dimorphism. No statocyst is present in the tail fan.

Members of this order occur in all oceans except the Arctic Ocean. They are generally meso- to bathypelagic (mostly > 1,000 m depth), but a few —mostly benthopelagic— species are common in shallower waters (< 200 m depth, e.g. many populations of *Lophogaster typicus* M. Sars, 1857). Interestingly, this group shows more species in the Pacific and Indian Oceans than in the Atlantic Ocean. Currently, a total of 50 living species plus one non-nomino-typical subspecies, belonging to eight genera and three families (Lophogastridae, Gnathophausiidae, and Eucopiidae), are recognized for the Lophogastrida (Anderson [2]).

## MATERIALS AND METHODS

Body length was measured from tip of rostrum to terminal margin of telson without spines. Most material studied was from pelagic and also epibenthic samples taken by the expeditions listed below. For additional sampling campaigns see Wittmann *et al.* [71]. From this extensive material, only those species are treated here in detail that were (also) confirmed for the Canaries.

Expeditions CANCAP-I (Madeira, 1976), CANCAP-II (Canaries, Morocco, 1977), CANCAP-III (Madeira, Mauritania, 1978), CANCAP-V (Azores, 1981), and CANCAP-VII (Cape Verde, 1986), and TYRO Mauritania-II (1988). Expeditions organized and material deposited in the National Natural History Museum (Rijksmuseum) Leiden.

Expedition ANTARKTIS-XXIII/2 organized by the Alfred-Wegener-Institut für Polar- und Meeresforschung, Bremerhaven: Pelagic samples taken in the S. Atlantic and Antarctic during southern summer 2005/06 with the vessel PFS Polarstern, leg. Ute Mühlenhardt-Siegel. Material at the Zoological Museum Hamburg.

Expeditions Kana Koeki, Norpax Equat. Himb. (tropical Pacific, 1977-1979), Dominator Cruise 021 (tropical Pacific, 1982), and Sargasso Eel & Maine, Cruise 83 (N.W. Atlantic, 1983). Material determined for the Smithsonian Oceanographic Sorting Center. Cruise 113 by FS "Poseidon" (off Portugal, 1984). Material at the Senckenberg Museum, Frankfurt am Main; coll. n° 39206-39212.

## RESULTS

### Order Lophogastrida G.O. Sars, 1870 Family Eucopiidae G.O. Sars, 1885

#### *Eucopia australis* Dana, 1852

*Eucopia australis* Dana [13]: 609-611, Pl. 40 (10a-m); Calman [5]: 15; Illig [35]: 404-405; Nouvel [45]: 26-27, Pl. I (17-19); Tattersall [60]: 48-49, Fig. 4C-D; Wittmann [70]: 130, Fig. 257; Wittmann & Wirtz [73]; Haroun & Garrido [30]; Wittmann *et al.* [71]; Fukuoka [23]: 407-408; Price *et al.* [52].

**Material studied:** S. Atlantic and Antarctic (all samples from expedition ANTARKTIS-XXIII/2): 11 spec., N of Bouvet Island, sta. 30-1, combined rectangular midwater trawls (RMT 1 and RMT 8), tow from 51.0117S 6.1283E to 51.1783S 6.3800E, 3,130-1,000 m, bottom 3,738 m, 25 Nov. 2005.- 2 spec., off Bouvet Island, sta. 34-1, RMT 8, tow from 55.0367S 2.9817E to 54.9150S 2.8317E, 1,000-2,429 m, bottom 2,860 m, 26 Nov. 2005.- 6 spec., Lazarev Sea, sta. 93-5, combined RMT 1 and RMT 8, tow from 64.9950S 2.9867W to 64.8083S 2.8300W, 1,000-3,003 m, bottom 3,270 m, 23 Dec. 2005.- 1 spec., Antarctic, NNW of Atka bay, sta. 127-1, RMT 8, tow from 69.4600S 8.9567W to 69.4083S 9.2117W, 1,000 m, bottom 2,850 m, 2 Jan. 2006.- 2 F ad., 1 M ad., 1 F subad., 3 imm., 3 juv., Antarctic, NNW of Atka bay, sta. 127-2, RMT 8, tow from 69.4083S 9.2183W to 69.2883S 9.6917W, 1,000-2,500 m, bottom 3,400 m, 2 Jan. 2006.

**Distribution.-** Depth range: 600-6,000 m. Cosmopolitan, but not found in Arctic waters. Well known from Antarctic, S. Atlantic, and Indian Oceans according to Ortmann [47, 48], Hansen [27], Zimmer [76], and Illig [35]. These samples confirm previous records from the S. Atlantic and Antarctic. In addition, this species was recorded by Calman [5] for deep waters SW off Ireland; by Nouvel [45] for the Azores, based on two juveniles only; and by Tattersall [60] for waters off Cape Verde Islands. Given in faunal lists by Haroun & Garrido [30] for the Canaries and by Price *et al.* [52] for the Gulf of Mexico.

#### *Eucopia grimaldii* H. Nouvel, 1942

*Eucopia Grimaldii* Nouvel [44]: 5-6, Figs. 5-8; [45]: 40-43, Pl. II (36-40).

*Eucopia grimaldii* - Tattersall & Tattersall [63]: 106-108, Fig. 11a; Tattersall [60]: 54-56, Fig. 5; [61]: 146; Casanova [7]: 20-22, 385, Fig. 6; Lagardère [37]: 812-813; Casanova *et al.* [8]: 60-61, Figs. 2-3; Wittmann & Wirtz [73]; Hargreaves [29]: 12, Tabs. 2, 4-6; Haroun & Garrido [30]; Wittmann *et al.* [71]; Fukuoka [23]: 408-409; Price *et al.* [52]; San Vicente [53].

*Eucopia grimaldi* - Vereshchaka [65]: 118.

**Material studied:** N.W. Atlantic.- 2 F ad., body length 25.2-27.9 mm, 1 imm., NW of Bermuda. 32.417N 64.983W, 1,000-2,000 m, 13 Sept. 1989, leg. Teddy Tucker; Bermuda Aquarium, Natural History Museum and Zoo.

**Distribution.-** Depth range: 300-3,000 m. Cosmopolitan, but not found in the Arctic and Antarctic Oceans. Recorded by Nouvel [45] from Azores, Canaries, and off Brittany. Reported

by Tattersall & Tattersall [63] for waters off Azores and Madeira, and by Tattersall [60] for waters off Cape Verde Islands.

### *Eucopia major Hansen, 1910*

*Eucopia major Hansen* [26]: 21, Pl. I (4a-b); Illig [35]: 405; Nouvel [45]: 28-29, Pl. I (20-25); Tattersall [62]: 33; Springer & Bullis [59]; Furnestin [24]: 181; Lagardère [37]: 812-813; Wittmann & Wirtz [73]; Haroun & Garrido [30]; Wittmann *et al.* [71]; San Vicente [53].

**Material studied:** Canary Islands.- 1 M ad., body length 66.8 mm, SW of Fuerteventura, Punta de Morrojable, 27.967N 14.200W, CANCAP-II, sta. 2.68, ring-trawl, 1,700 m, bottom 1,810 m, 29 Aug. 1977, 22.20-00.55 hrs.- 1 F imm. 37.1 mm, SW of El Hierro, off Punta de Orchilla, 27.600N 18.267W, CANCAP-II, sta. 2.140, ring-trawl with weight, 2,000 m, bottom > 2,800 m, 9 Sept. 1977, 3.15-6.15 hrs.

**Distribution.**- Depth range 1000-5000 m. Boreal to tropical waters of the Atlantic, Indian, and Pacific Oceans. Recorded by Nouvel [45] from Golfe de Gascogne, Canaries, and off the coast of Morocco. Indicated by Furnestin [24] with query for the Gulf of Lion (Mediterranean). The present results confirm the previous records from the Canaries.

### *Eucopia sculpticauda Faxon, 1893*

*Eucopia sculpticauda Faxon* [21]: 218; [22]: 219-221, Pls. K (2, 2d), LIII (1-1d); Hansen [25]: 7, Fig. 4; Illig [35]: 400-403, Figs. 1-6; Fage [20]: 56-60, Figs. 40-42; Nouvel [45]: 22-26, Pl. I (14-16); Tattersall & Tattersall [63]: 109-112, Figs. 12-13; Tattersall [60]: 52-54; [61]: 146; Casanova [7]: 300-302, 387-389, Fig. 86, Tab. 52; Lagardère [37]: 813-814; Wittmann & Wirtz [73]; Haroun & Garrido [30]; Wittmann *et al.* [71]: 1262, Tab. I; Price *et al.* [52].

*Eucopia intermedia Hansen* [25]: 5-7, Figs. 2-3.

**Material studied:** Madeira.- 1 F ad., body length 42.8 mm, S of Porto Santo, 32.883N 16.367W, CANCAP-III, sta. 3.021, ring-trawl with weight, wire 2,500 m, bottom 2,580-3,220 m, 16 Oct. 1978.- 1 imm. 29.6 mm, S of Madeira, 32.500N 16.817W, CANCAP-I, sta. 116, ring trawl, wire 500 m, bottom 2,320-2,420 m, 18 Mar. 1976.- 1 M ad. 40.3 mm, S of Madeira, 32.367N 16.917W, CANCAP-III, sta. 3.046, ring-trawl with stone, wire 2,000 m, bottom 3,160-3,200 m, 19 Oct. 1978.- 1 F ad. 47.1 mm, SE of Madeira, 32.450N 16.883W, CANCAP-I, sta. 1.105, ring-trawl, wire 1250 m, bottom 2,500-2,650 m, 17 Mar. 1976.- 1 F ad. 42.8 mm, S of Porto Santo, 32.883N 16.367W, CANCAP-III, sta. 3.021, ring-trawl with weight, wire 2,500 m, bottom 2,580-3,220 m, 16 Oct. 1978.

Morocco.- 1 M ad. 40.0 mm, W of Cape Yubi, 28.017N 13.367W, CANCAP-II, sta. 2.52, ring-trawl with weight, 400 m, bottom 570 m, 00.30-01.40 hrs, 28 Aug. 1977.

Canary Islands.- 1 imm. 12.5 mm, SW of Fuerteventura, Punta de Morrojable, 27.967N 14.200W, CANCAP-II, sta. 2.68, ring-trawl, 1,700 m, bottom 1,810 m, 22.20-00.55 hrs, 29 Aug. 1977.- 1 juv. 11.3 mm, sampling data as before, 8 Sept. 1994.- 1 F ad. 48.0 mm, SW of El Hierro, off Punta de Orchilla, 27.667N 18.167W, CANCAP-II, sta. 2.116, ring-trawl with weight, 1,000 m, bottom 2,500 m, 2.20-3.40 hrs, 5 Sept. 1977.- 2 F ad. 48.2-53.4 mm, 1 juv. with head missing, SW of El Hierro, off Punta de Orchilla, 27.600N 18.267W, CANCAP-II, sta. 2.140, ring-trawl with weight, 2,000 m, bottom > 2,800 m, 3.15-6.15 hrs, 8 Sept. 1977.- For additional materials see Wittmann *et al.* [71].

Mauritania.- 1 F ad. 50.0 mm in 2 parts, off Banc d'Arguin, 19.717N 17.500W, TYRO Mauritania-II, sta. MAU.104, 3.5 m Agassiz trawl in 1,500 m, 17 June 1988.

Cape Verde Islands.- 1 F ad. 56.8 mm, S of Santiago, 14.85N 23.25W, CANCAP-VII, sta. 7.001, midwater trawl, 0-750 m, 18 Aug. 1986.- 1 F ad. 32.2 mm, 2 M ad. 30.0-30.6 mm, S of Branco, 16.517N 24.817W, CANCAP-VII, sta. 7.148, midwater trawl, 0-1,100 m, 4/5 Sept. 1986.

Tropical Pacific.- 1 F ad. 52 mm, tow from 4.017N 150.183W to 4.183N 150.216W, 1,100 m, Norpax Equat. Himb., sta. 77-12-16, 11 Dec. 1977.

**Distribution.**- Depth range: 400-6,000 m. Cosmopolitan, but not found in the Arctic and Antarctic Oceans. Recorded by Illig [35] and Tattersall [60] for waters off Cape Verde Islands; by Fage [20] and Nouvel [45] from Azores, Madeira, Canaries, and off the coasts all along western Africa, from waters near Iceland, Hebrides, off Mexico and the Cape of Good Hope. The present results fit well with this distributional scheme.

### *Eucopia unguiculata* (Willemoes-Suhm, 1875)

*Chalaraspis unguiculata* Willemoes-Suhm [67]: 37-43, Pl. VIII.

*Eucopia unguiculata* - Colosi [11]: 2; Illig [35]: 403-405; Tattersall & Tattersall [63]: 101-106, Figs. 9-11; Tattersall [60]: 50-52, Fig. 4A-B; Springer & Bullis [59]; Wittmann & Wirtz [73]; Haroun & Garrido [30]; Nikoforos [40]; Wittmann *et al.* [71]: 1263, Tab. I; Price *et al.* [52]; San Vicente [53].

*Eucopia Hansenii* Nouvel [44]: 3, Figs. 1-4; Fage [20]: 47-56, Fig. 36; Nouvel [45]: 30-40, Pl. I (26-35).

*Eucopia hansenii* - Furnestin [24]: 181; Hoenigman [31]: 606-607, Fig. 3; Casanova [7]: 20-38, 201, Figs. 5-8, 48, 53, 55, 58, 70; Lagardère & Nouvel [38]: 384; Lagardère [37]: 811-812; Cartes & Sorbe [6]: 191, 194; Tabs. 1-2; San Vicente [53].

**Material studied:** N.W. Atlantic.- 1 M ad., body length 27.7 mm, NW of Bermuda, 32.417N 64.983W. 1000-2000 m, 13 Sept. 1989, leg. Teddy Tucker; Bermuda Aquarium, Natural History Museum and Zoo.

Mediterranean.- 1 fragmented subad. ca. 20 mm, Levantine Sea, S of Crete, tow with trawl from 34.383N 26.033E to 34.383N 26.087E, 4178-4390 m, F.S. Meteor cruise 5, section 1, sta. M5-22Ku, 18 Jan. 1987, leg. Senckenberg Institut Wilhelmshafen.

Madeira.- 1 F ad. 24.0 mm, 2 F subad., 2 F imm., S of Porto Santo, 32.883N 16.367W, CANCAP-III, sta. 3.021, ring-trawl with weight, wire 2,500 m, bottom 2,580-3,220 m, 16 Oct. 1978.- 6 imm./juv., S of Porto Santo, 32.883N 16.400W, CANCAP-III, sta. 3.035, ring-trawl with weight, wire 1,000 m, bottom 3,024-3,196 m, 17 Oct. 1978.- 2 F imm. 21.5-25.1 mm, SE of Madeira, 32.583N 16.733W, CANCAP-I, sta. 1.035, ring-trawl, wire 1,250 m, bottom about 2,000 m, 10 Mar. 1976.- 1 imm. 13.1 mm, S of Madeira, 32.567N 16.850W, CANCAP-I, sta. 88, ring-trawl, wire 1,500 m, bottom 1,920-2,060 m, 16 Mar. 1976.- 1 M 29.3 mm, 1 imm., S of Madeira, 32.517N 16.883W, CANCAP-I, sta. 1.115, ring-trawl, wire 1,000 m, bottom 2,350-2,400 m, 18 Mar. 1976, 22.20-00.55 hrs.- 1 F subad. 27.7 mm, 1 M subad. 27.0 mm, S of Madeira, 32.5N 16.9W, CANCAP-I, sta. 89, ring-trawl, wire 2,000 m, bottom 2,200-2,370 m, 16 Mar. 1976.- 4 F ad. 25.3-28.8 mm, S of Madeira, 32.500N 16.817W, CANCAP-I, sta. 116, ring trawl, wire 500 m, bottom 2,320-2,420 m, 18 Mar. 1976.- 1 M ad. 30.0 mm, 2 F ad. 27.6-28.5 mm, 1 F subad., 1 imm., SE of Madeira, 32.450N 16.883W, CANCAP-I, sta. 1.105, ring-trawl, wire 1,250 m, bottom 2,500-2,650 m, 17 Mar. 1976.- 1 F ad. 25.1 mm, 8 F subad., 4 imm., 6 juv., S of Madeira, 32.367N 16.917W, CANCAP-III, sta. 3.046, ring-trawl with stone, wire 2,000 m, bottom 3,160-3,200 m, 19 Oct. 1978.

Selvagens Islands.- Samples listed in Wittmann *et al.* [71].

Morocco.- 7 imm. 15.3-20.4 mm, 10 juv., W of Cape Yubi, 28.033N 13.450W, CANCAP-II, sta. 2.42, ring-trawl with weight, 750 m, bottom 1,000 m, 27 Aug. 1977, 03.50-05.30 hrs.- 3 F ad. 20.0-26.2 mm, 1 M ad. 21.3 mm, 1 F subad., 2 imm., W of Cape Yubi, 28.017N 13.367W, CANCAP-II, sta. 2.52, ring-trawl with weight, 400 m, bottom 570 m, 28 Aug. 1977, 00.30-01.40 hrs.

Canary Islands.- 1 F ad. 28.7 mm, 2 M ad. 27.2-31.1 mm, SW of Fuerteventura, Punta de Morrojable, 27.967N 14.200W, CANCAP-II, sta. 2.68, ring-trawl, 1,700 m, bottom 1,810 m, 29 Aug. 1977, 22.20-00.55 hrs.- 1 F ad. 28.6 mm, S of Fuerteventura, Punta Jandia, 27.783N 14.400W, CANCAP-II, sta. 2.06, abyssal plain at 2,050 m depth, 2.4 m Agassiz trawl, 23 Aug. 1977.- 1 M ad. 30.1 mm, 5 F ad. 25.5-31.2 mm, 1 F subad., 2 imm., 2 juv., SW of El Hierro, off Punta de Orchilla, 27.600N 18.267W, CANCAP-II, sta. 2.140, ring-trawl with weight, 2,000 m, bottom > 2,800 m, 8 Sept. 1977, 3.15-6.15 hrs.- 1 F imm. 25.6 mm, 1 imm. 25.5 mm, SW of El Hierro, off Punta de Orchilla, 27.550N 18.167W, CANCAP-II, sta. 2.151, ring-trawl with weight, 2,500 m, bottom 3,000 m, 10 Sept. 1977, 2.15-6.00 hrs.- 1 M ad. 26.2 mm, SW of El Hierro, off Punta de Orchilla, 27.350N 18.017W, CANCAP-II, sta. 2.164, ring-trawl, 0-2,000 m, bottom 2,700 m, 10 Sept. 1977, 21.14-00.45 hrs.

Mauritania.- Fragments of 1 F ad. and 1 F subad., off Mauritania, 18.850N 16.933W, TYRO Mauritania-II, sta. MAU.041, 3.5 m Agassiz trawl, 800-840 m, 10 June 1988.

Cape Verde Islands.- 1 F ad. 27.6 mm, 1 F imm., S of Branco, 16.517N 24.817W, CANCAP-VII, sta. 7.148, midwater trawl, 0-1,100 m, 4/5 Sept. 1986.- 2 F ad. 25.0-28.2 mm, N of Ilheu Grande, 15.133N 24.583W, CANCAP-VII, sta. 7.035, midwater trawl, 0-2,000 m, 23/24 Aug. 1986.- 1 M ad. 32.8 mm, 4 F subad. 26.2-29.3 mm, S of Santiago, 14.85N 23.25W, CANCAP-VII, sta. 7.001, midwater trawl, 0-750 m, 18 Aug. 1986.

S. Atlantic.- 3 spec., N of Bouvet Island, ANTARKTIS-XXIII/2, sta. 30-1, combined rectangular midwater trawls (RMT 1 and RMT 8), tow from 51.0117S 6.1283E to 51.1783S 6.3800E, 1,000-3,130 m, bottom 3,738 m, 25 Nov. 2005.

**Distribution.**- Depth range: 100-6,500 m. Mostly in tropical to temperate waters of the Pacific, Indian, and Atlantic Oceans, also in boreal and subarctic waters; absent in the Arctic and Antarctic Oceans. Recorded by Colosi [10, 11] from the Bosphorus (Marmora Sea) and the Gulf of Naples (Mediterranean), and by Illig [35] from waters off Madeira, Mauritania, and Senegal. Reported by Fage [20] and Nouvel [45] as *E. Hansenii* from many stations in the E. Atlantic between 37°S and 48°N, including Azores, Madeira, Canaries, and waters off the coast of Morocco; and from many stations in the W. Mediterranean between Gibraltar and Sardinia. Reported by Tattersall [60] as *E. unguiculata* for waters off Cape Verde Islands. The present results confirm previous records from the Atlantic.

## Fam. Gnathophausiidae Udrescu, 1984

### *Gnathophausia gracilis* Willemoes-Suhm, 1875

*Gnathophausia gracilis* Willemoes-Suhm [67]: 33-37, Pl. IX (1-15); Illig [35]: 409-410, Figs. 15-17; Fage [19]: 27-34, Figs. 27-30; Vereshchaka [65]: 118; Wittmann & Wirtz [73]; Haroun & Garrido [30]; Wittmann *et al.* [71]; Price *et al.* [52].

*Gnathophausia gracilis* var. *brevispinis* Wood-Mason & Alcock [74]: 188.

*Gnathophausia brevispinis* - Wood-Mason & Alcock [75]: 269; Faxon [22]: 216-218, 257-258, 262, Pl. J.

*Gnathophausia dentata* Faxon [21]: 217.

*Gnathophausia bidentata* Illig [34]: 229-230, Fig. 2.

**Material studied:** Canary Islands.- 1 M ad., body length 69.8 mm, SW of El Hierro, off Punta de Orchilla, 27.600N 18.267W, CANCAP-II, sta. 2.140, ring-trawl with weight, 2,000 m, bottom > 2,800 m, 8 Sept. 1977, 3.15-6.15 hrs.

Cape Verde Islands.- 2 imm. 76.8-79.3 mm, 1 juv., N of Ilheu Grande, 15.133N 24.583W, CANCAP-VII, sta. 7.035, midwater trawl, 0-2,000 m, 23/24 Aug. 1986.

N-Pacific (all samples by Norpax Equat. Himb.).- 2 F subad. 46-57 mm; 1 M ad. 68 mm, tow from 4.017N 150.183W to 4.183N 150.216W, 1,100 m, sta. 77-12-16, 11 Dec. 1977.- 1 F subad. 50 mm, tow from 13.5N 150.0W to 13.317N 150.000W, 950 m, sta. 78-1-2, 7 Jan. 1978.- 2 F subad. 56-66 mm, 1 M subad. 48 mm, 2 juv., tow from 20.017N 150.200W to 19.967N 150.383W, 900 m, sta. 77-12-34, 17 Dec. 1977.- 2 juv. 39-44 mm, tow from 21.33N 158.33W to 21.35N 158.50W, 1,100 m, sta. 78-05-6, 2 May 1978.

**Distribution.**- Depth range: 900-5,000 m. Circumtropical, so far not recorded from boreal to arctic waters. Reported by Fage [19] from (sub)tropical waters of all oceans, including waters off the Canary and Cape Verde Islands. The present results fit well with this distributional scheme.

### *Gnathophausia zoea* Willemoes-Suhm, 1873

*Gnathophausia zoëa* Willemoes-Suhm [66]: 401; [67]: 32-33, 37, Pl. X (4); Illig [35]: 408-409, Figs. 13-14; Nouvel [45]: 15-19, Pl. I (12), Tab. I; Tattersall & Tattersall [63]: 82-88, Figs. 3-5.

*Gnathophausia willemoesii* Sars [56]: 38, Pl. V (1-6); Faxon [22]: 215, Pl. K (1).

*Gnathophausia zoea* var. *sarsi* Wood-Mason & Alcock [74]: 187.

*Gnathophausia cristata* Illig [34]: 319-321, Figs. A-B.

*Gnathophausia zoea* - Fage [19]: 34-39, Figs. 31-36; Lagardère & Nouvel [38]: 377-382, Figs. 1-10; Lagardère [37]: 810; Vereshchaka [65]: 118; Escobar-Briones & Soto [17]; Dürr [15]; Wittmann & Wirtz [73]; Dürr & González [16]; Haroun & Garrido [30]; Wittmann *et al.* [71]: 1261; Price *et al.* [52]; San Vicente [53].

**Material studied:** N.E. Atlantic off Portugal (all samples from FS "Poseidon" cruises).- 1 F ad., body length 54.4 mm, 41.155N 9.333W, sta. Pos 113-9/kul 1002, 800-900 m, 20 Nov. 1984.- 1 M ad. 42.9 mm, 40.120N 9.838W, sta. Pos 113-11 ZD 1010, 1,160-1,340 m, 21 Nov. 1984.- 1 M ad. 44.9 mm, 39.217N 10.360W, sta. Pos 113-16 ZD 1017, 1,380-1,450 m, 22 Nov. 1984.- 2 imm. 24.9-35.8 mm, 39.217N 10.210W, sta. Po-113/1017 ZD, 740-920 m, 22 Nov. 1984.

Canary Islands.- 2 spec. 31.7-35.2 mm, SW of Fuerteventura, Punta de Morrojable, 27.967N 14.200W, CANCAP-II, sta. 2.68, ring-trawl, 1,700 m, bottom 1,810 m, 29 Aug. 1977, 22.20-00.55 hrs.- 1 spec. ca. 47 mm, SW of El Hierro, off Punta de Orchilla, 27.65N 18.20W, CANCAP-II, sta. 2.123, ring-trawl with weight, 1,500 m, bottom > 2,000 m, 2.25-4.50 hrs, 6 Sept. 1977.- 1 F subad. ca. 48.9 mm, SW of El Hierro, off Punta de Orchilla, 27.667N 18.167W, CANCAP-II, sta. 2.130, 1.2 m Agassiz trawl, 1,500-1,800 m, 8 Sept. 1977.

Mauritania.- 3 F ad. 57.7-62.3 mm, 2 M ad. 52.5-56.7 mm, 1 imm., off Mauritania, 20.367N 17.900W, CANCAP-III, sta. 3.119, 5 m beam trawl, 1,000 m, 28 Oct. 1978.- 1 M ad. 58.4 mm, 1 F subad. 57.5 mm, 3 imm., off Banc d'Arguin, 19.717N 17.500W, TYRO Mauritania-II, sta. MAU.104, 3.5 m Agassiz trawl in 1,500 m, 17 June 1988.- 2 F ad. 62.3-63.8 mm, 4 M ad. 53.2-64.9 mm, 4 subad., 5 imm., off Mauritania, 19.150N 16.867W, TYRO Mauritania-II, sta. MAU.062, 2.4 m Agassiz trawl, 800-1,200 m, steep slope, 12 June 1988.- 3 F ad. 49.6-59.7 mm, 2 M ad. 58.4-60.0 mm, 1 M subad., 4 imm., 2 juv., off Mauritania, 19.050N 16.967W, TYRO Mauritania-II, sta. MAU.042, 3.5 m Agassiz trawl in 820-990 m, 10 June 1988.- 1 F ad. 48.5 mm, 4 M ad. 51.1-64.0 mm, 6 F subad., off Mauritania, 18.850N 16.933W, TYRO Mauritania-II, sta. MAU.041, 3.5 m Agassiz trawl in 800-840 m, 10 June 1988.

Cape Verde Islands.- 1 spec. ca. 47 mm in 2 parts, N of Ilheu Grande, 16.567N 24.683W, CANCAP-VII, sta. 7.147, 1.2 m Agassiz trawl in 1,500-1,627 m, 4 Sept. 1986.- 1 F imm. ca. 51 mm, SE of Sao Nicolau, off Preguica, 16.533N 24.233W, CANCAP-VII, sta. 7.137, 1.2 m Agassiz trawl in 715 m.

3 Sept. 1986.- 1 spec. 26.8 mm, S of Santiago, Pta Temerosa, 14.883N 23.533W, CANCAP-VII, sta. 7.023, 1.2 m Agassiz trawl in 525 m, 22 Aug. 1986.

N. Pacific (all samples by Norpax Equat. Himb.).- 1 M ad. 103 mm, 2 M imm., 2 juv., tow from 21.33N 158.33W to 21.35N 158.50W, 1,200 m, sta. 78-05-5, 2 May 1978.- 4 juv. 62-73 mm, tow from 21.33N 158.33W to 21.35N 158.50W, 1,100 m, sta. 78-05-6, 2 May 1978.- 1 F ad. 113 mm, 1 F imm., tow from 21.33N 158.33W to 21.50N 158.50W, 1,100 m, sta. 77-11-5, 1 Nov. 1977.

**Distribution.**- Depth range: 400-6,000 m. Cosmopolitan, mainly (sub)tropical, also in boreal to subarctic waters, but not in the Arctic Ocean. Recorded by Fage [19] and Nouvel [45] from the Azores. Cited by Nouvel [45] for Atlantic waters between Greenland and the Cape of Good Hope. First record for the Canaries by Wittmann *et al.* [71]. Cited by San Vicente [53] for the Mediterranean. The present results fit well with the previously known distribution.

### *Neognathophausia gigas* Willemoes-Suhm, 1873

*Gnathophausia gigas* Willemoes-Suhm [66]: 400; [67]: 28-31, 37, Pls. IX (16-17), X (2-3); Fage [19]: 24-27, Fig. 26; Nouvel [45]: 12-15, Pl. I (5-11); Tattersall & Tattersall [63]: 77-82, Figs. 1-2; Lagardère [37]: 810.

*Gnathophausia drepanephora* Holt & Tattersall [32]: 113, 142, Fig. I, Pl. XVIII; Ortmann [48]: 38; Illig 1930: 408.

*Neognathophausia gigas* - Petryashev [49]: 47-48, Pl. 1 (1-5); [50]: 959, 968-969, Fig. 2; [51]: Tab. 2; Wittmann & Wirtz [73]; Haroun & Garrido [30]; Wittmann *et al.* [71]: 1261, Tab. I; Fukuoka [23]: 405-406.

**Material studied:** N. Pacific.- 1 F subad., body length 107 mm, 1 M subad. 99 mm, 4 F imm., 3 juv., Bering Sea, 53.227N 163.838W, Dominator Cruise 021, sta. 75, midwater trawl, 681 m, 1 Aug. 1982.- 1 juv. 52 mm, tow from 21.33N 158.33W to 21.35N 158.50W, 1,100 m, Norpax Equat. Himb., sta. 78-05-6, 2 May 1978.

**Distribution.**- Depth range: 300-4,000 m. Cosmopolitan, but not found in the Arctic Ocean. Recorded by Fage [19] for temperate to tropical waters of the Pacific and the N. Atlantic, including the Cape Verde Islands; by Nouvel [45] from the Azores, Brittany, and Gibraltar; by Haroun & Garrido [30] for the Canaries. The E. Atlantic distribution ranges from Ireland to Dakar according to Nouvel [45].

### *Neognathophausia ingens* (Dohrn, 1870)

*Lophogaster ingens* Dohrn [14]: 610, Pl. 31 (12-14).

*Gnathophausia ingens* - Sars [56]: 30, Pl. II; Illig [35]: 407-408, Figs. 11-12; Fage [19]: 15-24, Figs. 20, 24-25; Nouvel [45]: 9-12, Pl. I (4); Tattersall [60]: 31-35; Casanova [7]: 328-330; Escobar-Briones & Soto [17]: Tab. 1.

*Gnathophausia calcarata* Sars [56]: 35, Pl. IV; Ortmann [48]: 30, Pl. I (2a-f).

*Gnathophausia bengalensis* Wood-Mason & Alcock [75]: 269.

*Gnathophausia doryphora* Illig [34]: 227, Fig. 1A-D.

*Neognathophausia ingens* - Petryashev [49]: 47-48; [50]: 959, 968-969, Fig. 3; [51]: Tab. 2; Dürr [15]; Wittmann & Wirtz [73]; Dürr & González [16]; Haroun & Garrido [30]; Wittmann *et al.* [71]: 1261, Tab. I.

**Material studied:** Madeira.- 1 juv., body length 36.8 mm, SE of Madeira, 32.583N 16.733W, CANCAP-I, sta. 1.035, ring-trawl, wire 1,250 m, bottom about 2,000 m, 10 Mar. 1976.

Canary Islands.- Samples listed in Wittmann *et al.* [71].

Cape Verde Islands.- 1 spec. 90.3 mm, SW of Sal, 16.700N 23.683W, CANCAP-VII, sta. 7.114, 0-330 m, midwater trawl, 31 Aug. 1986.- 1 spec. 49.4 mm, S of Branco, 16.517N 24.817W, CANCAP-VII, sta. 7.148, 0-1,100 m, midwater trawl, 4-5 Sept. 1986.

Tropical Pacific (all samples by Norpax Equat. Himb).- 2 M ad. 112-122 mm, 2 F imm., 4 juv., tow from 21.33N 158.33W to 21.50N 158.50W, 1,200 m, sta. 78-05-5, 2 May 1978.- 1 F subad., tow from 21.33N 158.33W to 21.50N 158.50W, 310 m, sta. 77-11-2, 31 Oct. 1977.- 1 F imm. 84 mm, 1 juv., tow from 21.33N 158.33W to 21.50N 158.50W, 1,100 m, sta. 77-11-5, 1 Nov. 1977.- 3 juv. 36-40 mm. tow from 15.083N 150.183W to 15.217N 150.183W, 295 m, sta. 77-12-30, 15 Dec. 1977.- 1 F subad. 88 mm, tow from 14.983N 153.000W to 15.083N 153.000W, 400 m, sta. 79-02-8, 19 Feb. 1978.- 3 juv. 38-54 mm, tow from 14.733N 157.983W to 14.617N 157.983W, 330 m, sta. 79-5-3, 12 May 1979.- 1 F subad. 181 mm, tow from 9.850N 150.000W to 9.833N 150.017W, 1,500 m, sta. 79-2-1, 8 Feb. 1979.- 2 juv. 58-72 mm, 0.867N 153.033W to 0.967N 153.033W, 360 m, sta. 79-5-12, 23 May 1979.- 2 juv. 58-63 mm, tow from 1.367S 150.167W to 1.483S 150.167W, 290 m, sta. 77-12-10, 9 Dec. 1977.- 1 juv. 70 mm, tow from 3.067S 157.950W to 3.067S 157.833W, 320 m, sta. 78-5-11, 20 May 1978.- 1 juv. 70 mm, tow from 6.967S 158.117W to 6.833S 158.133W, 335 m, sta. 77-12-6, 6 Dec. 1977.

**Distribution.**- Depth range: 200-4,000 m. Circumtropical, ranging from temperate to tropical latitudes. Recorded by Fage [19] from the Pacific, Indian, and Atlantic Oceans; including waters off Azores, Madeira, Canary, and Cape Verde archipelagos, and off the continental coasts of Morocco and West Sahara. Recorded by Nouvel [45] from the Azores, Canaries, and Gibraltar. Details for the Canaries in Wittmann *et al.* [71]. The present results fit well with the already known distribution.

### Fam. Lophogastridae G.O. Sars, 1870

#### *Chalaraspidum alatum* (Willemoes-Suhm, 1876)

*Chalaraspis alata* Willemoes-Suhm [68]: 592; Fage [18]: 68-75, Figs. I-VII; [19]: 4, Figs. 1-10.

*Chalaraspidum alatum* - Willemoes-Suhm [69]: 521; Tattersall [62]: 14-15; Tattersall [60]: 28-30, Fig. 1; Springer & Bullis [59]; Haroun & Garrido [30]; Price *et al.* [52].

*Ectyaspis alata* - Faxon [22]: 219.

**Distribution.**- Depth range: 1,000-3,000 m. Cosmopolitan, but so far not recorded from the Arctic and Antarctic Oceans. It was listed by Haroun & Garrido [30] for the fauna of the Canaries, by Springer & Bullis [59] and Price *et al.* [52] for the Gulf of Mexico. A damaged specimen of this genus was recorded without determination at species level by Zimmer [76] from the Azores.

#### *Lophogaster spinosus* Ortmann, 1907

*Lophogaster spinosus* Ortmann [48]: 26-27, Pl. I (1a, b); Fage [20]: 23-29, Figs. 13-15, 16f, 17g; Casanova [7]: 352, Fig. 82; Dürr [15]; Dürr & González [16]; Wittmann *et al.* [71]: 1261-1262, Tab. I.

**Material studied:** Canary Islands.- Samples listed in Wittmann *et al.* [71].

NW-Atlantic.- 1 F subad., body length 26 mm, 2 juv., tow from 24.772N 70.410W to 24.745N 70.440W, Sargasso Eel & Maine, Cruise 83, sta. 1014, 280 m, 17 Feb. 1983.- 1 F subad. 24 mm, 2 juv., tow from 24.747N 70.385W to 24.718N 70.405W, Sargasso Eel & Maine, Cruise 83, sta. 1055; ALQ 1/16, 304 m, 24 Feb. 1983.

**Distribution.-** Depth range: 200-5,000 m. According to Fage [20] restricted to tropical and subtropical waters of the W.- and E. Atlantic. The present results fit well with this distributional scheme.

### *Lophogaster typicus* M. Sars, 1857

*Lophogaster typicus* Sars [57]: 160; [58]: 1-37, Tabs. I-III; Norman [42]: 459; [43]: 10; Colosi [10]: 6-7, Figs. 7, 7a; [11]: 2; Illig [35]: 405; Fage [20]: 7-13, figs. 2-4, 16b, 17b; Nouvel [45]: 7-8, Pl. I (1-3); Tattersall & Tattersall [62]: 90-97, Figs. 6-8; Tattersall [61]: 145; Hoenigman [31]: 605-606, Fig. 2; Lagardère & Nouvel [38]: 382-383; Katagan [36]: 288; Wittmann & Stagl [72]: 160; Dürr [15]; Dürr & González [16]; Nikoforos [40]; Wittmann *et al.* [71]: 1262, Tab. II; San Vicente [53].

*Ctenomysis alata* Norman [41]: 151.

*Lophogaster serratus* Björck [4]: 6-8, Figs. 1-5.

**Material studied:** Boreal to temperate N.E. Atlantic.- 3 F ad., body length 18.0-20.5 mm, 3 M ad. 17.7-20.0 mm, Norway, Hjeltefjord, 61.583N 4.917E, 260 m, 4 July 1978, leg. Torleiv Brattegård.- 1 F ad. 24.4 mm, 1 F ad. with pleon missing, Norway, W of Stavanger 59.112N 3.083E, 153-156 m, 7 Aug. 1984, Senckenberg Museum, Frankfurt am Main.- 1 F ad. 18.7 mm, 4 M ad. 18.2-23.5 mm, 1 F subad., off Portugal, 41.9217N 9.3167W, FS "Poseidon", sta. Po-113-7 ZD2 999, 6 F ad. 25.5-32.1 mm, 4 M ad. 25.5-27.1 mm, 3 juv., off N-Portugal, 41.917N 9.333W, FS "Poseidon", sta. Pos113-7 ZD1 998, 175-184 m, 18 Nov. 1984.- For sample off Ireland see Wittmann & Stagl [72].

Azores.- 1 F ad. 21.8 mm, S of São Miguel, 37.650N 25.517W, CANCAP-V, sta. 5.012, van Veen grab in 480 m, 26 May 1981.

Mediterranean.- 1 F ad. 17.5 mm, Adriatic Sea, off Zirje, 43.5847N 15.6333E, Ockelmann epibenthic sledge in 199 m, mud, 12 Sept. 1971, leg. Peter Cate.- 1 F ad. 15.8 mm, Adriatic Sea, E of Ancona, 42.4633N 17.1667E, Ockelmann epibenthic sledge in 400 m, 4 July 1973, leg. Peter Cate.- 1 F ad. 20.7 mm, Sardinia, Gulf of Cagliari, 539-560 m, 20 July 1984, 07:48-09:25 hrs.- 1 F ad. 21.5 mm, 1 M imm., Sardinia, Gulf of Cagliari, 329-402 m, 20 July 1984, 16:00-17:30 hrs.- For sample off Messina see Wittmann & Stagl [72].

Canary Islands.- 1 M 23.8 mm, S of Fuerteventura, Punta Jandía, 28.050N 14.483W, CANCAP-II, sta. 2.03, van Veen grab in 140-200 m, 23 Aug. 1977, 22.20-00.55 hrs.

Mauritania.- 3 M ad. 19.0-23.4 mm, off Mauritania, 18.833N 16.467W, TYRO Mauritania-II, sta. MAU.022, 1.2 m Agassiz trawl in 60-66 m, 8 June 1988.

**Distribution.-** Mainly benthopelagic in 30-500 m. Fage [20] provided a number of records from the Mediterranean and concluded that this species may be restricted to the N.E. Atlantic and Mediterranean. According to Nouvel [45], it occurs in the E. Atlantic from Norway to Mauritania, throughout the Mediterranean Sea, and as far east as the Bosphorus. In line with this, Tattersall & Tattersall [63] and Tattersall [61] argued that previous records from the Pacific may be attributed to other species and concluded that *L. typicus* may be restricted to the (N&S) E. Atlantic and Mediterranean. The present results fit well with this distributional scheme.

## DISCUSSION

### Taxonomic notes

The following discussions may help to reduce certain confusions and misunderstandings in the literature about lophogastrids:

Status of *E. hansenii* Nouvel, 1942, versus *Eucopia unguiculata* Willemoes-Suhm, 1875.- Willemoes-Suhm [67] described *E. unguiculata* based on material of the "Challenger" expedition. Hansen [26] re-examined this material and concluded that it actually belongs to three different species, *E. unguiculata*, *E. australis*, and *E. sculpticauda*. Nouvel [44] noted much confusion about the identity of *E. unguiculata* and proposed to suppress this taxon in favour of two new taxa, established by him in the same publication as *E. hansenii* and *E. grimaldii*. According to the nomenclatorial code of that time, still valid today (ICZN [33]), he ought not to have suppressed but to have revised the taxon *unguiculata* and to have described only one new species (probably *E. grimaldii* based on longer spines on the telson). Therefore we agree with Tattersall [60], who considered *E. hansenii* a junior synonym of *E. unguiculata*.

Status of the genus *Neognathophausia* Petryashev, 1992, versus *Gnathophausia* Willemoes-Suhm, 1873.- Fage [19] established three morphologically distinct groups within the genus *Gnathophausia*: group I with *G. ingens* and *G. gigas*, group II with *G. gracilis* only, and group III with all remaining species of the genus. Later, Tattersall [60] essentially confirmed this grouping, but she argued that it would not be practical for taxonomic purposes. Based on the structure of antennal scale, maxillipeds, and abdominal pleura, Petryashev [49] defined a new genus, named *Neognathophausia*, to include all members of group I. Casanova *et al.* [8], however, rejected the definition of the new genus. Their conclusion was based on rRNA gene sequences and morphological data, in their opinion pointing to a basal position of *G. gracilis* with respect to the two remaining groups. However, they examined only one species per group, which appears quantitatively insufficient to estimate genetic distance between multi-species groups. Unless further evidence is presented, *Neognathophausia* may be maintained, as already practiced (without detailed reasoning) by Wittmann *et al.* [71], Petryashev [50, 51], Fukuoka [23], and Anderson [2].

Doubtful Mediterranean records of *Lophogaster affinis* Colosi, 1930.- This species is well known from the Red Sea and Indian Ocean (Colosi [12], Coiffmann [9], Nouvel [46], Almeida Prado-Por [1]). Previous reports for the Mediterranean were found only in secondary literature (Müller [39], Nikoforos [40], San Vicente [53]). These later reports may be based merely on erroneous interpretation of a puzzling formulation by Fage [20] on p. 20: "Mais il existe, de l'autre côté de la Méditerranée, dans la moitié septentrionale de la Mer Rouge, une forme décrite par Colosi (1929) sous le nom de *L. affinis* ..." to our translation "But on the other side of the Mediterranean, in the northern half of the Red Sea, there is a form described by Colosi (1929) under the name *L. affinis* ...". From this and additional data, we conclude that this species has so far never been found in the Mediterranean.

### Diversity and distribution of the Canarian lophogastrids

Most species show a widespread geographical distribution, typical of oceanic, meso- to bathypelagic organisms. Tab. 1 compiles the so far known distribution of the diverse species in mostly subtropical waters of the N.E. Atlantic, for comparison also including the Gulf of Mexico. Ten out of the twelve species from the Canary Islands have a world-wide distribution. The remaining two species are endemic for the Atlantic Ocean, i.e. *Lophogaster spinosus*

on both sides of the Atlantic, and *L. typicus* only in the E. Atlantic. A similar pattern is found in the Gulf of Mexico: nine out of the eleven species are cosmopolitan, only *L. americanus* and *L. longirostris* are endemic for the western Atlantic (species list compiled from Springer & Bullis [59], Escobar-Briones & Soto [17], and Price *et al.* [52]).

The Canaries apparently represent the most species-rich area in the Atlantic due to high sampling intensity in combination with favourable natural conditions: comparably high plankton and micronekton densities representing good feeding grounds influenced by the Saharan upwelling along the African Atlantic coast, < 90 km from the Canary archipelago (Barton *et al.* [3]), and strong depth gradients allowing deep-water organisms to approach closely to the islands. Compared with the four N.E. Atlantic archipelagos considered in table 1, fewer species are reported along the continental coasts of Morocco and Mauritania compared to the Canary Islands. The same pattern is found in the oligotrophic Mediterranean basin, characterized by a ‘shallow’ entrance through the Strait of Gibraltar and by warmer, more saline bottom water.

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## REFERENCES

- [1] ALMEIDA PRADO-POR, M.S. 1980. Mysidacea from the Gulf of Elat (Gulf of ‘Aqaba). *Israel Journal of Zoology*, 29: 188-191.
- [2] ANDERSON, G. 2010. Lophogastrida Classification, January 20, 2010. <http://peracarida.usm.edu/LophogastridaTaxa.pdf>. 1-2. (Instant Web Publishing, USA) [21.1.2010].
- [3] BARTON, E.D., J. ARÍSTEGUI, P. TETT, M. CANTON, J. GARCÍA-BRAUN, S. HERNÁNDEZ-LEÓN, L. NYKJAER, C. ALMEIDA, J. ALMUNIA, S. BALLES-TEROS, G. BASTERRETXEÀ, J. ESCÁNEZ, L. GARCÍA-WEILL, A. HERNÁNDEZ-GUERRA, F. LÓPEZ-LAATZEN, R. MOLINA, M.F. MONTERO, E. NAVARRO-PÉREZ, J.M. RODRÍGUEZ, K. VAN LENNING, H. VÉLEZ & K. WILD. 1998. The transition zone of the Canary Current upwelling region. *Progress in Oceanography*, 41:455-504.
- [4] BJÖRCK, W. 1916. Svenska kräfdjur i Göteborgs Museum 1. Schizopoda. *Meddelanden från Göteborgs Musei zoologiska Afdelning*, 7: 1-17.
- [5] CALMAN, W.T. 1896. On the deep-sea Crustacea from the southwest of Ireland. *Transactions of the Royal Irish Academy*, 31: 1-20, pls. I-II.
- [6] CARTES, J.E. & J.C. SORBE. 1995. Deep-water mysids of the Catalan Sea: species composition, bathymetric and near-bottom distribution. *Journal of the Marine Biological Association of the United Kingdom*, 75(1): 187-197.
- [7] CASANOVA J.-P. 1977. *La faune pelagique profonde (zooplancton et micronekton) de la province atlanto-méditerranéenne. Aspects taxonomique, biologique et zoogéographique*. These, Université de Provence (Aix - Marseille I): i-ix, 1-500.

- [8] CASANOVA, J.P., L. DE JONG & E. FAURE. 1998. Interrelationships of the two families constituting the Lophogastrida (Crustacea: Mysidacea) inferred from morphological and molecular data. *Marine Biology*, 132(1): 59-65.
- [9] COIFMANN, I. 1937. I misidacei del Mar Rosso. Studio del materiale raccolto dal Prof. L. Sanzo durante la campagna idrografica della R. Nave Ammiraglio Magnaghi (1923-1924). *Memorie del R. Comitato Talassografico Italiano*, 233: 1-52, Pls. I-XXV.
- [10] COLOSI, G. 1922. Eufausiacei e Misidacei raccolti nella campagna del 1920. *Memorie del R. Comitato Talassografico Italiano*, 96: 1-12, Tab. 1.
- [11] COLOSI, G. 1929. I Misidacei del Golfo di Napoli. *Pubblicazioni della Stazione Zoologica di Napoli*, 9(3): 405-439.
- [12] COLOSI, G. 1930. Lofogastridi nuovi. *Bulletino di Zoologia*, 1(4): 119-125.
- [13] DANA, J.D. 1852. Crustacea. Part I. In: *United States Exploring Expedition during the years 1838-1842 under the command of Charles Wilkes, U.S.N.*, 13: i-viii, 1-685. (C. Sherman, Philadelphia).
- [14] DOHRN, A. 1870. Untersuchungen über Bau und Entwicklung der Arthropoden. 10. Beiträge zur Kenntnis der Malacostraken und ihrer Larven. *Zeitschrift für wissenschaftliche Zoologie*, 20: 607-625, 3 pls.
- [15] DÜRR, J. 1997. *Nahrungsökologie von Beryx splendens und Beryx decadactylus (Osteichthyes, Berycidae) im Bereich der Kanarischen Inseln*. In: Diplomarbeit an der Mathematisch-Naturwissenschaftlichen Fakultät: 1-85. (Christian-Albrechts-Universität, Kiel).
- [16] DÜRR, J. & J.A. GONZÁLEZ. 2002. Feeding habits of *Beryx splendens* and *Beryx decadactylus* (Berycidae) off the Canary Islands. *Fisheries Research*, 54: 363-374.
- [17] ESCOBAR-PRIONES, E. & L.A. SOTO. 1991. Biogeografía de los Misidáceos (Crustacea: Peracarida) del Golfo de México. *Caribbean Journal of Science*, 27(1-2): 80-89.
- [18] FAGE, L. 1939. A propos d'un mysidacé bathypélagique peu connu: *Chalaraspis alata* G.O. Sars (Willemoes-Suhm in lit.). *Archives de Zoologie expérimentale et générale*, 80: 68-76.
- [19] FAGE, L. 1941. Mysidacea Lophogastrida - I. The Carlsberg Foundation's oceanographical expedition round the world 1928-1930 and previous Dana-expeditions under the leadership of Prof. Johannes Schmidt. *Dana Reports*, 4(19): 1-52.
- [20] FAGE, L. 1942. Mysidacea Lophogastrida - II. The Carlsberg Foundation's oceanographical expedition round the world 1928-1930 and previous Dana-expeditions under the leadership of Prof. Johannes Schmidt. *Dana Reports*, 4(23): 1-67.
- [21] FAXON, W. 1893. VI. Preliminary descriptions of new species of Crustacea. In: Reports on the dredging operations off the west coast of Central America to the Galápagos, to the west coast of Mexico, and the Gulf of California; in charge of Alexander Agassiz, carried on by the U.S. Fish Commission Steamer Albatross during 1891. *Bulletin of the Museum of Comparative Zoölogy at Harvard College*, 24 (7): 149-220.
- [22] FAXON, W. 1895. XV. The stalk-eyed Crustacea. In: Reports on an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands, in charge of Alexander Agassiz, by the U.S. Fish Commission Steamer Albatross during 1891. *Memoirs of the Museum of Comparative Zoölogy at Harvard College*, 18: 1-292, 67 pls.
- [23] FUKUOKA, K. 2009. Deep-sea mysidaceans (Crustacea: Lophogastrida and Mysida) from the northwestern North Pacific off Japan, with descriptions of six new species. In:

- Fujita, T. (ed.), Deep-sea fauna and pollutants off Pacific coast of northern Japan. *National Museum of Nature and Science Monographs*, 39: 405-446.
- [24] FURNESTIN, M.-L. 1960. Zooplankton du Golfe du Lion et de la côte orientale de Corse. *Revue des Travaux de l'Institut des Pêches Maritimes*, 24 (2): 153-252.
- [25] HANSEN, H.J. 1905. Preliminary report on the Schizopoda collected by H.S.H. Prince Albert of Monaco during the cruise of the Princesse-Alice in the year 1901. *Bulletin du Musée Océanographique de Monaco*, 30: 1-32.
- [26] HANSEN, H.J. 1910. The Schizopoda of the Siboga Expedition. *Siboga Expeditie, Monographie*, 37: 1-123, pls. 1-16. (Leyden).
- [27] HANSEN, H.J. 1913. Report on the Crustacea Schizopoda collected by the Swedish Antarctic Expedition 1901-1903, under the charge of Baron Dr. Otto Nordenskjöld: 1-56. (G.E.C. Gad, Copenhagen).
- [28] HANSEN, H.J. 1927. *Sergestidés et Schizopodes*. In: Expédition scientifique du "Travailleur" et du "Talisman" 1880-3: 1-26, pl. I. (G. Mason, Paris).
- [29] HARGREAVES, P.M. 1999. The vertical distribution of micronektonic decapod and mysid crustaceans across the Goban Spur of the Porcupine Seabight. *Sarsia*, 84: 1-18.
- [30] HAROUN, R. & M.J. GARRIDO. 2003. *Orden Mysidacea*. P. 68, 69 in: L. Moro, J.L. Martín, M.J. Garrido & I. Izquierdo (eds.), *Lista de especies marinas de Canarias (algas, hongos, plantas y animales) 2003*: 248 pp. (Consejería de Política Territorial y Medio Ambiente, Tenerife).
- [31] HOENIGMAN, J. 1963. Mysidacea de l'expedition Hvar (1948-49) dans l'Adriatique. *Rapportes de la Commission internationale pour l'Exploration scientifique de la Mer Méditerranée*, 17: 603-616.
- [32] HOLT, E.W.L. & W.M. TATTERSALL. 1905. Schizopodous Crustacea from the north-east Atlantic slope. *Scientific Investigations. Fisheries Branch, Department of Agriculture for Ireland, Dublin - Annual Report*, 1902-1903, pt. II, app. IV: 99-152, pls. XV-XXV.
- [33] ICZN (International Commission on Zoological Nomenclature), 1999. International Code of Zoological Nomenclature, 4<sup>th</sup> edition: 1-306. (International Trust for Zoological Nomenclature, London). Also available at <http://www.iczn.org/iczn/index.jsp>
- [34] ILLIG, G. 1906. 4. Ein weiterer Bericht über die Schizopoden der Deutschen Tiefsee Expedition 1898-1899. II. Gnathophausien (Fortsetzung). *Zoologischer Anzeiger*, 30(10): 319-322.
- [35] ILLIG, G. 1930. *Die Schizopoden der Deutschen Tiefsee-Expedition*. In: C. Chun (ed.), *Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer „Valdivia“ 1898-1899*, 22(6): 397-620.
- [36] KATAGAN, T. 1985. Mysidacés et cumacés des côtes égéennes de Turquie. *Rapportes et procès-verbaux des Réunions de la Commission internationale pour l'Exploration scientifique de la Mer Méditerranée*, 29(5): 287-288.
- [37] LAGARDÈRE, J.P. 1983. Les mysidacés de la plaine abyssale du Golfe de Gascogne 1. Familles des Lophogastridae, Eucopiidae et Petalophthalmidae. *Bulletin du Muséum national d'Histoire naturelle*, 4<sup>ème</sup> série, section A (Zoologie, Biologie, Écologie animale), 5(3): 809-843.
- [38] LAGARDÈRE, J.P. & H. NOUVEL. 1980. Les Mysidacés du talus continental du golfe de Gascogne. II. Familles des Lophogastridae, Eucopiidae et Mysidae (tribu des Ery-

- thropini exceptée). *Bulletin du Muséum national d'Histoire naturelle*, 4<sup>ème</sup> série, section A (Zoologie, Biologie, Écologie animale), 2(2): 375-412.
- [39] MÜLLER, H.-G. 1993. World catalogue and bibliography of the recent Mysidacea. 1-491. (Wissenschaftlicher Verlag H.-G. Müller, Wetzlar).
- [40] NIKOFOROS, G. 2002. Fauna del Mediterraneo. 1-366. (Giunti, Firenze).
- [41] NORMAN, A.M. 1862. On the Crustacea, Echinodermata, and zoophytes obtained in deep-sea dredging off the Shetland Isles in 1861. *Reports of the British Association for the Advancement of Science*, 31(1861): 151-152.
- [42] NORMAN, A.M. 1892. British Schizopoda of the families Lophogastridae and Euphausiidae. *Annals and Magazine of natural History*, Ser. VI, vol. 9: 454-464.
- [43] NORMAN, A.M. 1905. Museum Normanianum, or a catalogue of the Invertebrata of the Arctic and north Atlantic temperate ocean and Palaearctic region. III. Crustacea. 2<sup>nd</sup> ed.: i-vi, 1-47. (Thos. Cadleugh & Son, Printers, Durham).
- [44] NOUVEL, H. 1942. Sur la systématique des espèces du genre *Eucopia* Dana 1852 (Crust. Mysidacea). *Bulletin de l'Institut Océanographique*, 818: 1-8. (Monaco).
- [45] NOUVEL, H. 1943. Mysidacés provenant des campagnes du Prince-Albert Ier de Monaco. In : J. Richard (ed.), *Résultats des campagnes scientifiques accomplies sur son yacht par Albert Ier*. Fasc. 105, 1-128, pls. I-V. (Imprimerie de Monaco).
- [46] NOUVEL, H. 1978. Mysidacés récoltés par S. Frontier a Nosy Bé. VII. *Lophogaster affinis* Colosi et *Mesopodopsis africana madagascariensis* n. ssp. *Bulletin de la Société d'Histoire Naturelle de Toulouse*, 113(3-4): 396-403.
- [47] ORTMANN, A.E. 1906. Schizopods of the Hawaiian Islands collected by the steamer Albatross in 1902. *Bulletin of the United States Fish Commission*, 23, pt. 3(1903): 961-973.
- [48] ORTMANN, A.E. 1907. Schizopod crustaceans in the U.S. National Museum. The families Lophogastridae and Eucopiidae. *Proceedings of the United States National Museum*, 31: 23-54, pls. I, II.
- [49] PETRYASHEV, V.V. 1992. Notes on mysid systematics (Crustacea, Mysidacea) of Arctic and the North-Western Pacific. *Zoologicheskij Zhurnal*, 71(10): 47-58.
- [50] PETRYASHEV, V.V. 2005. Mysids (Crustacea, Mysidacea) collected by Soviet and Russian Antarctic expeditions. Lophogastrida, Petalophthalmida, and Mysida: Boreomysidae. *Zoologicheskij Zhurnal*, 84(8): 957-973.
- [51] PETRYASHEV, V.V. 2007. Biogeographical division of Antarctic and Subantarctic by Mysid (Crustacea: Mysidacea) fauna. *Russian Journal of marine Biology*, 33(1): 1-16.
- [52] PRICE, W.W., R.W. HEARD, P. AAS & K. MELAND. 2009. *Lophogastrida* (Crustacea) of the Gulf of Mexico, 923-927 in D.L. Felder & D.K. Camp (eds.), Gulf of Mexico-Origins, Waters, and Biota. Biodiversity. (Texas A&M Press, College Station, Texas).
- [53] SAN VICENTE, C. 2010. Mysidaceans. In: M. Coll, C. Piroddi, J. Steenbeek, K. Kaschner, F. Ben Rais Lasram, J. Aguzzi, E. Ballesteros, C.N. Bianchi *et al.* (eds.), Biodiversity of the Mediterranean Sea: estimates, patterns & threats. *PloS ONE*, 5(8): e11842: 254-275.
- [54] SARS, G.O. 1870. Carcinologiske Bidrag til Norges Fauna. I. Monographi over de ved Norges Kyster forekommende Mysider. Pt. 1. 1-64, 5 pls. (K. Norske Videnskab. Trondhjem, Christiania).
- [55] SARS, G.O. 1884. Preliminary notice on the Schizopoda of H.M.S. Challenger expedition. *Forhandlinger i Videnskabs-Selskabet*, 7(1883): 1-43. (Christiania).

- [56] SARS, G.O. 1885. Report on the Schizopoda collected by H.M.S. Challenger during the years 1873-1876. In: G.S. Nartes (ed.), *Report on the scientific results of the Voyage of H.M.S. Challenger during the years 1873-76*, 13(37): 1-228, 38 pls. (Longmans & Co., London).
- [57] SARS, M. 1857. Om 3 nye norske Krebsdyr. *Forhandlinger ved det Skandinaviske Naturf. Møde i Christiania*, 7: 160-175.
- [58] SARS, M. 1862. Beskrivelse over Lophogaster typicus, en maerkvaerdig form af de lavere tiføddede krebsdyr. In: *Universitetsprogram for andet Halvaar 1862*, i-iv, 1-37, Tabs. I-III. (Det Kongl. Norske Universitet, Christiania).
- [59] SPRINGER, S. & H.R. BULLIS, Jr. 1956. Collections by the Oregon in the Gulf of Mexico. List of crustaceans, molluscs and fishes identified from the collections made by the exploratory fishing vessel Oregon in the Gulf of Mexico and adjacent seas 1950 through 1955. *Special Scientific Report: Fisheries*, 196: 1-134. (United States Fish and Wildlife Service, Washington, D. C.).
- [60] TATTERSALL, O.S. 1955. Mysidacea. *Discovery Reports*, 28: 1-190.
- [61] TATTERSALL, O.S. 1961. Mysidacea from the coasts of tropical West Africa. *Atlantide Report*, 6: 143-159.
- [62] TATTERSALL, W.M. 1951. A review of the Mysidacea of the United States National Museum. *Bulletin of the United States National Museum*, 201: 1-292.
- [63] TATTERSALL, W.M. & O.S. TATTERSALL. 1951. The British Mysidacea. Ray Society, Monograph, no. 136: 1-460. (The Ray Society, London).
- [64] UDRESCU, A. 1984. Transspecific-evolution (family level) within Lophogastrida. A new family - Gnathophausiidae (Lophogastrida, Mysidacea). *Travaux du Muséum national d'Histoire naturelle «Grigore Antipa»*, 25: 59-77.
- [65] VERESHCHAKA, A.L. 1990. Mysids from seamounts of Nasca and Sala-y-Gomez Ridges. *Trudy Instituta Okeanologii Akademija Nauk SSSR*, 124: 118-128.
- [66] WILLEMOES-SUHM, R. von. 1873. Notes from the Challenger, VII. *Nature*, 8: 400-403.
- [67] WILLEMOES-SUHM R. von. 1875. II. On some Atlantic Crustacea from the Challenger expedition. *Transactions of the Linnean Society of London, Zoology*, Ser. II, vol. 1(1): 23-59, Pls. VI-XIII.
- [68] WILLEMOES-SUHM R. von. 1876. Preliminary report to Prof. Wyville Thomson, on Crustacea observed during the cruise of H.M.S. Challenger in the southern seas. *Proceedings of the Royal Society of London*, 24: 585-592.
- [69] WILLEMOES-SUHM, R. von. 1895. In: J. Murray (ed.), A summary of the scientific results obtained at the sounding, dredging, and trawling stations of H.M.S. Challenger. *Report on the scientific results of the voyage of H.M.S. Challenger during the years 1872-76*, 1: i-vii, 1-796. (Eyre and Spottiswoode, London).
- [70] WITTMANN, K.J. 1990. Mysidacea. In: J. Sieg & J.W. Wägele (eds.), *Fauna der Antarktis*. Paul Parey, Berlin: 130-133.
- [71] WITTMANN, K.J., F. HERNÁNEZ, J. DÜRR, E. TEJERA, J.A. GONZÁLEZ & S. JIMÉNEZ. 2004. The epi- to bathypelagic Mysidacea (Peracarida) off the Selvagens, Canary, and Cape Verde Islands (NE Atlantic), with first description of the male of *Longithorax alicei* H. Nouvel, 1942. *Crustaceana*, 76(10): 1257-1280.
- [72] WITTMANN, K.J. & V. STAGL. 1996. Die Mysidaceen-Sammlung am Naturhistorischen Museum in Wien: eine kritische Sichtung im Spiegel der Sammlungsgeschichte. *Annalen des Naturhistorischen Museums in Wien*, 98B: 157-191.

- [73] WITTMANN, K.J. & P. WIRTZ. 1998. A first inventory of the mysid fauna (Crustacea: Mysidacea) in coastal waters of the Madeira and Canary archipelagos. *Boletim do Museu Municipal do Funchal*, (Sup.) 5: 511-533.
- [74] WOOD-MASON, J. & A. ALCOCK. 1891a. Natural history notes from H.M. Indian Marine Steamer Investigator, Commander R.F. Hoskyn, R.N., commanding. - No. 12. Note on the results of the last season's deep-sea dredging. *Annals and Magazine of natural History*, ser. 6, vol. 7: 186-202.
- [75] WOOD-MASON, J. & A. ALCOCK. 1891b. Natural history notes from H.M. Indian Marine Steamer Investigator, Commander R.F. Hoskyn, R.N., commanding. On the results of deep-sea dredging during the season 1890-91. *Annals and Magazine of natural History*, ser. 6, vol. 8: 268-286.
- [76] ZIMMER, C. 1914. Die Schizopoden der deutschen Südpolar-Expedition 1901-1903. In: E. von Drygalski (ed.), *Deutsche Südpolar-Expedition 1901-1903, XV. Zoologie*, 7: 377-445, Pls. XXIII-XXVI.

**Tab. 1.-** Evidence of lophogastrids in subtropical waters off islands and continental coasts of the N.E. Atlantic, the Mediterranean, the Gulf of Mexico<sup>(1)</sup>.

Family	Species	Distribution <sup>(2)</sup>	Azores	Madeira	Canary Islands	Cape Verde Islands	Mediterranean Sea	Morocco	Mauritania	Gulf of Mexico
Eucopiidae	<i>Eucopia australis</i> Dama, 1852	C	+	-	+	+	-	-	-	+
	<i>Eucopia grimaldii</i> H. Nouvel, 1942	C	+	+	+	+	+	+	-	+
	<i>Eucopia major</i> Hansen, 1910	C	-	+	+	-	?	+	-	+
	<i>Eucopia sculpticauda</i> Faxon, 1893	C	+	+	+	+	+	+	+	+
Gnathophausiidae	<i>Eucopia ungniculata</i> (Willmoeus-Suhm, 1875)	C	+	+	+	-	+	+	+	+
	<i>Gnathophausia affinis</i> G.O. Sars, 1876	EA	+	-	-	-	+	-	-	-
	<i>Gnathophausia gracilis</i> Willmoeus-Suhm, 1875	C	-	-	+	+	-	-	-	+
	<i>Gnathophausia zoea</i> Willmoeus-Suhm, 1873	C	+	+	+	+	+	-	+	+
Neognathophausiidae	<i>Neognathophausia gigas</i> Willmoeus-Suhm, 1873	C	+	+	+	-	-	-	-	-
	<i>Neognathophausia ingens</i> (Dohrn, 1870)	C	+	+	+	-	+	+	+	+
	<i>Chalaraspidium alatum</i> Willmoeus-Suhm, 1874	C	?	-	+	-	-	-	-	+
	<i>Lophogaster americanus</i> W.M. Tattersall, 1951	WA	-	-	-	-	-	-	-	+
Lophogastridae	<i>Lophogaster longirostris</i> Faxon, 1896	WA	-	-	-	-	-	-	-	+
	<i>Lophogaster spinosus</i> Ortmann, 1907	A	-	-	+	-	-	-	-	-
	<i>Lophogaster subglaber</i> Hansen, 1927	EAM	-	-	-	+	-	-	-	-
	<i>Lophogaster typicus</i> M. Sars, 1857	EAM	+	-	+	-	+	-	+	-
Number of lophogastrid species		9-10	7	12	7	6-7	6	5	11	

(1) present data and according to authors indicated in synonymy lists given above.

(2) C, cosmopolitan (without Arctic, in part also without Antarctic); A, Atlantic (W&E); WA, western Atlantic; EA, eastern Atlantic; EAM, East-Atlantic-Mediterranean.